Digital Stereo Recording of Traditional Malaysian Musical Instruments

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ABSTRACT

This paper offers details of the recording techniques and editing processes of the wave samples of traditional Malaysian musical instruments, which are used for a multi-media project.

The project's outcome includes a bank of digital samples of the indigenous instruments, for musicians and composers to use with conventional triggering devices such as keyboards, computers or drum triggers.

Finally, the paper includes a discussion of Malaysian instrument classification an examination of Malaysian media musical content, and a brief analysis of contemporary Malaysian musical culture.

1. INTRODUCTION

The genesis of this project can be traced to a set of conditions that were identified at the outset of the Fulbright lecturing/research award that I began in June 1999 in Malaysia. The activities outlined in the award (titled "Music Technology") were to include teaching courses in multi-track recording and music technology, planning and setting up a multi-track recording studio, and organizing an international conference in the area of music technology.

As a part of the research component of the award, it was the intent to also record examples of indigenous traditional music to be used in the production of cultural radio programming for my home campus' public radio station.   Toward that end, I took along a DAT recorder specially equipped for field use, two dynamic microphones with cables, headphones, a supply of tapes, and as a backup, a stereo cassette recorder.

Unfortunately, it quickly became apparent that indigenous Malay music is not easy to find. In the curriculum of the music department at the *Universiti Putra Malaysia (UPM)*, the host university and department for the Fulbright award, there is very little mention of traditional music: 2 out of 67 undergraduate courses (10).   Similarly, traditional instruments are increasingly uncommon and expensive. Many of those existing instruments have fallen into disrepair.

2. CULTURAL BACKGROUND

Before proceeding, a note about Malaysian culture and Malay music. Malaysia in a multi-ethnic country with

a population comprised of roughly one-half *Malays*, who are ethnically similar to their neighboring Indonesians. Nearly all the ethnic Malays are Muslim, and recently Malaysia was declared a Muslim state. More than a third of the country's population is of Chinese descent, and are largely the descendants of workers brought to the Malaysian peninsula by the British to work the tea and rubber plantations, and tin mines (3).

Less than one-fourth of the population is of Indian ancestry, and again are the descendants of workers who were immigrated during the British colonial era to work plantations and mines. Finally, a small percentage of the population (less than ten percent) is the true indigenous people known as *Orang Asli* ("original man"). The Orang Aslis differ ethnically and religiously from the Malays; they are animists (3).

Naturally each of these ethnic groups has brought its own musical traditions to contemporary peninsular Malaysia. One can find Chinese instrumentation and modalities, as well as Indian musical styles. Thus, for this project we will focus on the *Malay* music, which has more in common with Indonesian music that with Chinese or Indian (4).

The present status of traditional Malay music may best be understood by looking briefly at the broader cultural milieu that seems to be shifting toward *westernization*. This shift may be attributable in some part to the current prevailing push in Malaysia toward modernization and the achieving of first world status. Labeled *"Vision 2020"* by Prime Minister Mahathir, the heavily publicized plan is to have the country fully developed by the target year, 2020 (5). Various components of *"Vision 2020"* include such conventional measures as improvements in literacy rates, poverty rates, life expectancy, and infant mortality rates.

Another conspicuous feature of the Prime Minister's plan is the much-ballyhooed *"Multimedia Super-corridor."* In 2000 Mahathir also announced the addition of a Hollywood-like entertainment village at the MSC. This entertainment village will be positioned to attract film production projects to Malaysia, which is climatically well suited to year-round production. The announcement also carried with it the call for more "*technologically skilled*" workers in the media arts (5). This theme of increasing the number and quality of Malaysia's information technology (*IT*) workers is pervasive throughout the *Vision 2020* rhetoric, to the exclusion and to the detriment of cultural preservation.

3. MALAYSIAN MEDIA

A brief examination of Malaysian media content offers evidence of the erosion of traditional Malay musical culture. The output of feature length productions from Malaysia's film industry is currently almost non-existent. Malaysian multiple-screen cinema exhibit films produced primarily in the U.S., Taiwan, and India. Older black and white Malaysian-produced films are aired weekly on one or more of the *"free-to-air"* television channels, but the production values and quality are so poor as to be laughable.

Electronic media content in Malaysia, while more prolific, exhibits a heavy western influence in the production values employed and the sources of programming. This westernization further contributes to the de-emphasis of traditional indigenous music and instrumentation in the emerging popular culture.

Privately owned free-to-air television channels *TV3*, *NTV7* and *Metrovision* all offer a mixture of U.S.-produced programming, Taiwanese productions, and locally produced programming following the conventional western template. (Especially notable in the context of music programming is *NTV7*'s daily schedule of music videos, culled from U.S. pop charts, airing from 1:00pm to 5:00pm.) The remaining two free-to-air stations, *TV1* and *TV2*, operated by government-owned Radio-Television Malaysia, rely less on western-produced programming, but their local productions adhere to conventions firmly rooted in western tradition.

Serialized dramas are a staple of Malaysian-produced prime time free-to-air television programming. Shot on videotape and often on location, these dramas look much like any other low-budget single camera video production. Conspicuous in the context of this project is the heavy use of sequencer/sampler/synthesizer based musical accompaniment, all based on western (versus Malay) motifs.

In order to gauge whether Malaysian free-to-air television might be contributing to the decline of indigenous music, and the subsequent engendering of western music (and as a part of the overall focus of my research on Southeast Asian media), a quantitative analysis of the free-to-air programming was performed. Television content was evaluated and classified according to these broad definitions: *locally produced cultural programming, locally produced news/public affairs/documentary, locally produced entertainment, non-Malaysian Asian produced*

news/public affairs/documentary/cultural, non-Malaysian Asian produced entertainment, western produced news/public affairs/documentary/cultural, western produced entertainment.

A simple coding scheme was devised to assign a numerical rating according to the classifications above. A rating of seven was assigned to locally-produced cultural and documentary programming, which had the greatest likelihood of containing traditional indigenous music. A rating of six was assigned to local news and public affairs, which was less likely to include traditional indigenous music. Five was assigned to locally produced entertainment programming, which was likely to have local but not traditional music, and so forth.

The intent of the system was to rank highest those locally produced programs containing examples of traditional indigenous music, to rank lowest those programs imported from the west, and to assign ordinal rankings to all others according to their perceived local cultural (musical) content.

7	*locally produced documentary and cultural programming*
6	*locally produced news and public affairs programming*
5	*locally produced entertainment*
4	*non-local Asian-produced news; documentary; public affairs; cultural programming*
3	*non-local Asian-produced entertainment*
2	*non-local western-produced news; documentary; public affairs; cultural programming*
1	*non-local western-produced entertainment*

Randomly selected weekly program schedules (Monday through Friday, 6:00pm to 11:00pm) were culled from newspapers over a two-month period, and content analysis done for each quarter hour. In most cases the descriptive notes in the program schedules provided adequate details about the content to assign rankings. In those instances where the content was unclear based on the descriptions, viewing was done to confirm the appropriate classification.

It is worth noting that for the purposes of this project, "religious" programming was counted as cultural programming. This decision was made in light of the government's recognition of Islam as the "official religion" of Malaysia, one result of which is that religion has become inextricably intertwined with most other aspects of the culture, including music. All of the free-to-air stations offer some type of Islamic programming daily during prime time. Nearly

all the religious programming contains music that might be considered as traditional indigenous music.

The significant results of this examination for the purposes of this paper indicate the following: "Cultural" content accounts for 2.5% of the available programming; "news/public affairs/documentaries" accounts for 25% of the programming; "locally produced entertainment" accounts for 23.5% of the programming; 18% of the programming is non-local Asian produced; and a whopping 31% is western produced programming. Thus it might be concluded that viewers whose only choices were free-to-air signals have little access to local cultural programming that would contain and perpetuate traditional indigenous music.

Other television viewing options in peninsular Malaysia include *"MEGA TV,"* which is a subscription service delivered by microwave that offers CNN (Asian feed), The Discovery Channel, ESPN (Asian feed), HBO (Asian feed), AXN (Action Network), a Taiwanese channel, and a day-parted channel which is divided between Cartoon Network, TNT and Variety Channel; nearly all western programming.

Alternatively, many upscale Malaysians and much of the sizable expatriate community subscribe to *ASTRO* TV, which is a digital direct broadcast satellite service that currently offers approximately 20 television channels, including all of the same channels available on MEGA-TV plus Disney, National Geographic, Showtime CNBC, Star Movie, Bloomberg and others. ASTRO currently claims to have over two hundred thousand subscribers.

One final home entertainment viewing option which should be noted, as it constitutes a large if unmeasured commercial and leisure activity is the *"video compact disc" (VCD)*. The vast majority of the VCD's sold are illegal copies of recently released U.S. feature films. The pirated discs are widely available at all "night markets" for a price of about two U.S. dollars. Malaysian viewers seem willing to overlook the miserable quality of the discs, often clandestinely recorded in a cinema with a palm camcorder. Prices are about double (four U.S. dollars) for legal copies purchased in legitimate outlets.

Thus, based on the foregoing, it could be concluded that traditional Malay music is not readily available to television audiences, nor does it appear to be demanded or sought out by viewers.

Radio programming is similarly dominated by western music and production values. The privately owned commercial stations are known by names or acronyms similar to those used in the U.S. (rather than frequencies or call letters) such as *"Hitz," "Mix," "EZ-FM,"* and the like. The programming on these stations is predominantly, if not exclusively, familiar western popular music formats such as "contemporary hit radio," "adult contemporary," "easy listening," and "dance music." On-air performers have adopted equally familiar delivery styles such as the morning drive ensemble. According to the on-air announcers, the play-lists are drawn largely from western "chart" sources such *Billboard.*

State-run *(RTM)* radio offers similar popular music fare, in addition to its news and information services in all of the Malaysian languages (Bahasa Malay, Mandarin, and Tamil). Of the ten radio channels operated by RTM, only *Radio Irama Malayu Asli* consistently programs <u>traditional</u> Malay music.

Long-term random listening suggests that Chinese popular music (largely imported from Taiwan) appears to be second to western music in popularity based on radio airplay, TV music video play and sales of recorded music. In a country whose culture has historically viewed intellectual property law as an impediment and an unnecessary expense, it is somewhat difficult to determine sales statistics with any certainty. But, the ubiquitous CD/tape shops typically devote approximately one-third to one-half of their shelf space to Chinese artists.

4. MALAY MUSIC

So it would appear that as sometimes happens in a developing country, the indigenous musical culture of Malaysia is being obscured and adulterated by the proliferation of imported media content. According to ethnomusicology scholars at *UPM* and other Malaysian educational institutions, some musical forms that have only been perpetuated through the aural tradition are already disappearing or lost completely. (6) Certain forms of Malay music are said to possess therapeutic powers, which were once described as "magical" powers by early western scholars (8). Little contemporary research exists on these phenomena, because such beliefs are based in *animism*, and as such are officially discouraged by the Malaysian government.

One such increasingly unusual traditional form of music is called *"gamelan."* The gamelan music is said by some to have supernatural powers. People

have described being put into a trance-like state after listening to gamelan music, and others have attributed healing or curative powers to the music (4). Performed in an ensemble, gamelan uses instruments that are also becoming rare and difficult to find. The *keromong* or *bonang* is an instrument constructed of a series of tuned gongs suspended in a wooden frame and played with a wooden mallet called a *pemalu*. The *saron* is similar to the xylophone. Completing the ensemble is a drum called the *gendang*, and a gong.

The gamelan instruments, and most of the other local instruments, are hand-constructed using traditional techniques that are nearly lost. Drum makers, gong makers, and luthiers interviewed in the course of this project are most often older individuals, working alone or with one or two apprentices. All of these craftsmen learned from their fathers and grandfathers. The instruments are not mass- produced, and the music is not mass consumed.

Presently the availability of traditional Malay music, performed on traditional instruments, is limited almost entirely to presentations made for tourists, and put on through organizations such as the Ministry of Tourism Arts and Culture and the tourist information centers.

So it is within this context that the project focus was shifted slightly to seeking out examples of traditional Malay instruments, to make digital stereo recordings of those instruments, and to use those recordings to create digital samples of the instruments' waveforms for <u>preservation</u> purposes. One application for these digital samples would be the creation a bank of *sound-fonts* that would be triggered from a *MIDI* controller (e.g. keyboard, drum trigger, etc.) allowing musicians to "play" the traditional instruments using contemporary technology.

The samples would further be used to develop a site on the world-wide-web that contains *.JPG* photos of the instruments with associated *Java* applets that could be "clicked" to hear associated *.WAV* files of their sounds. And, finally the samples would be used to produce a CD-ROM containing pictures and sounds similar to those on the web site.

5. MALAY INSTRUMENTS

It was decided to focus first on the Malay percussion instruments. This decision was based on the assumption that the samples derived from the recordings of the percussion instruments would be most easily edited and converted into a bank of usable *sound-fonts*. Percussion samples would

require no *"looping,"* the technique involved in creating a note with variable sustain. And further, many percussion instruments would require fewer samples to capture the instruments' tonal range.

Looping can be a very tricky business. Consider the example of creating a life-like sample of a single piano note: As the hammer strikes the strings there is an abrupt *start* of the event, called the *attack*. This point in time marks the greatest amplitude in sound pressure level that is generated by the note. Immediately following the attack, the amplitude begins to *decay* or lower. Depending on the amount of damping applied to the strings, they may continue to *sustain* or vibrate for some variable length of time. Until, finally, the vibrations of the string will cease to be audible, a point known as the *release*. This *attack, decay, sustain, release (ADSR)* is known as the sound's *envelope* (1). Thus to create a suitable life-like sample, one problem is that of locating a point in the envelope where the sample can be looped, to achieve a natural sounding sustainable note with no audible "edit."

In order for a looped sample to be realistically "played" then, the triggering device (e.g. keyboard or other MIDI controller) must be able to send multiple sets of data to the sample playback device: data that will trigger the start of the playback of the sample, data that will vary the sustain by allowing the user to determine when the release of the note will occur, and data that will communicate information about the "intensity" of the attack, or how hard the note was played.

Two of the traditional Malay instruments involve playing styles that result in extremely complex envelopes. The *rebab* (genus: *kordofon* or stringed) is a three-stringed "fiddle" that is played with a bow and so has a variable sustain, with further subtleties induced by the performer such as timbral nuances associated with whether the note is played "up-bow" or "down-bow," and slight variations in amplitude and frequency resulting from vibrato (7).

The *serunai* (genus: *erofon* or wind) is a reed wind instrument, somewhat akin to the oboe, and is played using a technique called "circle breathing" or "cycle breathing." In this breathing technique the performer draws in air through the nose, while constantly blowing air into the instrument with the mouth. The result is a series of shifting tones with infinite sustain (7).

The second complication in creating samples of polytonal instruments is that of determining a proper sampling interval. Again using the example of the piano, the most life-like samples would logically be those in which each of the instrument's eighty-eight notes were sampled and stored, and were available for triggering. Obviously, each note contains unique timbral characteristics, in addition to differences in pitch.

This is however a process that consumes a tremendous amount of time, and disk or RAM memory space. So, frequently compromises are made and the instrument is sampled at some reasonable interval, and notes in between those intervals are played by shifting the pitch of the sampled notes up or down by the appropriate increment.

6. RECORDING THE INSTRUMENTS

Again, in the light of the foregoing it was decided to begin the project by making recordings of percussion instruments as they would require no looping, and fewer samples to capture the instruments full tonal range.

Malay percussion instruments can be classified into two general categories: *membranofons* (those with a "skin" or membrane, i.e. drums) and *idiofons* (the instrument's material is struck or shaken to produce sound). Percussion instruments may be also categorized as *"tuned"* and *"non-pitched."* Thus, tuned idiophones include instruments such as vibes, xylophones, marimbas, tubular bells, and other variations. Non-pitched idiophones include cymbals, temple blocks, tambourines and so on (7). Keeping with the philosophy of beginning with the tonally simplest sounds, the first instruments to be sampled were primarily of the membranous category, as well as some of the simpler non-pitched idiophones, and a few tuned idiophones with limited numbers of notes.

Drumming and percussion have a long and rich history in Malay musical culture, so there were many instruments to locate and record. Fortunately, an instrument maker in Kuala Lumpur, (Mr. Hamzah Awang Awat) who has been designated a "national art laureate" by the Malaysian government, agreed to provide the instruments and performances for the recordings from which the samples would be taken. Thus many of the instruments and a virtuoso performer were available at one location. In addition to the various drums, Mr. Hamzah also constructs and performs on the *rebab* and the *serunai*.

The drums recorded were the *gedombak*, the *gendang*, the *geduk*, the *kompang*, and the *rebana*. Other percussion instruments recorded at the same session were the *angklung* (non-pitched idiophone), the *kesi* (non-pitched idiophone), the Malay gong (tuned idiophone), and the *canang* (tuned idiophone). The *canang* is constructed using the same type of gong used in the *keromong*, only with just two notes rather than the ten to twelve found on a *keromong*. (See photos in appendix.)

The recording technique employed used a *coincident* microphone arrangement. Two dynamic cardioid microphones were positioned in a variation of *"X-Y"* or *"crossed pair"* placement.

It was decided to make stereo recordings because of the playing styles and nature of instruments recorded. The *gendang* drum, for example, is a two-headed instrument that has a larger diameter head on one end than the other. The *gendang* is laid horizontally across the performer's lap with the one head to the left, and the other to the right. Thus one would expect that the player hears something slightly different with the left ear, than with the right. Simply stated, one ear might hear more of the higher pitched sound of the smaller drumhead; the other ear might hear more of the drum's lower pitch emanating from the larger end. The hope was to capture this phenomenon as a stereo event.

The microphones were placed in very close proximity to each other and with their two diaphragms roughly at a ninety-degree angle relative to one another. It has been shown that this technique captures a *sound-field* with good stereo imaging, but with a narrow stereo spread, which is acceptable for this project (2). Moreover, coincident miking is reported to yield more accurate stereo imaging than *spaced pair configurations* (1).

The coincident placement also minimizes the potential of phase cancellation or reinforcement artifacts resulting from a single sound pressure wave arriving at the two microphones' diaphragms at different points in time (11).

With the two microphones connected directly to the left and right inputs of the DAT recorder, recording at a sampling rate of 48,000 Hz, two different placements of the coincident microphone pair were used to capture each of the samples. In the first placement, the microphone pair was placed just over the performer's head, and angled down slightly. This position would place the microphones in a location

near the performer's ears, thus capturing a timbre most similar to that heard by the performer.

In the second placement the microphone pair was positioned in front of the performer to capture the sound from the position of a listener. Recording the samples from two positions will allow later spectral analysis comparisons of the listener's location versus the performer's location, and provide some flexibility in the final process of editing the sound-fonts.

While much simpler than the complex envelopes of wind instruments (e.g. the *serunai*) or stringed instruments (e.g. the *rebab*) which are affected much more by the technique of the performer, variations in playing technique also produce a surprisingly wide range of sounds from even the simplest drum. Mr. Hamzah, who also teaches drum technique at the National Arts Academy in Kuala Lumpur (Akademi Seni Kabangsan), demonstrated and identified by name each variation in striking the particular instrument being recorded. Each type of stroke is known by a unique name such as *"tak,"* or *"doh,"* just as western drum techniques are identified by names such as "roll," "rim-shot," and "paradiddle," etc.

Some of the variations in technique on a given drum might include the following: a short, sharp strike in the center of the head with the fingertips with the head muted; a short, sharp strike in the center of the head with the fingertips with the head resonating; a short, sharp strike near the rim with the fingertips with the head muted; a short, sharp strike near the rim with the fingertips with the head resonating; an open palmed slap in the center of the head with the head muted; an open palmed slap in the center of the head with the head resonating; etc. It should be easy to see that there can be a tremendous variety of different sounds produced by a simple single headed drum.

Multiple examples of each of these individual tones was recorded in the manner previously described, and an improvisational performance on each instrument was also recorded to demonstrate the playing techniques employed when the instrument is used to interpret a traditional Malay song.

The greatest problem encountered in making the recordings was the uncontrolled acoustic environment. Because of the large number of instruments, which were all housed at the *Akademi Seni Kabangsan (A.S.K.)*, where Mr. Hamzah builds, maintains, and teaches his students to perform on the instruments, the logical approach seemed to be to transport the recording equipment to that location. The *A.S.K.* is

however located in the very heart of metropolitan Kuala Lumpur. The aging unadorned two-story buildings are something of an anachronism, situated about one block away from the glass and steel Petronas "Twin Towers" (reputed tallest buildings in the world).

With none of the *A.S.K.* buildings offering any significant acoustic isolation from the noise of traffic and construction, the compromise was to set up in a central building at the rear of the campus, furthest from the street, in a room offering the best acoustic environment. The rest became a matter of patience and timing, waiting for and seizing the quiet intervals that punctuate the general hum of urban life.

7. CONCLUSION

The results were satisfactory. Enough recordings of each instrument were made to yield at least one usable sample of each type of sound.   Especially when played back through headphones, the samples clearly reproduce a stereophonic sound field in which the listener can discern a separate and distinct timbre from the left and right channels. These recordings were logged and selected samples were digitally transferred to a computer and stored as *".WAV"* files for editing using a software-based tool.

Ambient sound from air handlers and street noise was first removed by sampling and applying a noise reduction algorithm to the stereo sample. Next the samples were edited for length and the decay was smoothed to achieve manageable file size. These full bandwidth files were uploaded to the web site, and stored to disk, for use by electro-acoustic musicians.

In order for the sounds to be linked to digital photos of the instruments on the web site, the *.WAV* files had to be made modified. The *.WAV* files proved to be too large and required the spawning of a separate player. The *.WAV* files were converted to eight-bit monaural *.AU* type files, which have a much lower sample rate (8,000Hz), but may be played back using a *JAVA* applet, and thus require no separate player to be spawned.   These sounds are compromised in bandwidth and fidelity, but as they play back instantly, they achieve the goal of the web site, which is to give the viewer an indication of the type of sounds associated with the various instruments.

The resultant website may be viewed at:
http://www.zanesville.ohiou.edu/malaysia

References

1. Alten, Stanley R. *Audio in Media: The Recording Studio.* Wadsworth, 1996.

2. Ceoen, Carl. "Comparative Stereophonic Listening Tests," *Stereophonic Techniques Anthology,* Audio Engineering Society, 1986.

3. Malaysian Tourism Promotion Board Ministry of Culture, Arts, Tourism. *Malaysia, Fascinating Destination,* 1996.

4. Malm, William P. *Music Cultures of the Pacific, the Near East and Asia, Third Edition*. Prentice-Hall, 1996.

5. Multimedia Development Corporation. *Unlocking the Full Potential of the Information Age.* MDC, 1999.

6. Nasuruddin, Mohammed Ghouse. *The Malay Traditional Music*. Dewan Bahasa dan Pustaka, 1992.

7. Salleh, Nik Mustapha Nik Mohammed. *Alat Muzik Tradisional Dalam Masyarakat Melayu Di Malaysia.* Percetakan Watan Sdn. Bhd, no date given.

8. Skeat, Walter William. *Malay Magic*. (Originally published 1900). Dover, 1967.

9. Taylor, Eric. *Musical Instruments of Southeast Asia*. Oxford University Press, 1989.

10. University Putra Malaysia. *Akademic Kalendar.* University Putra Malaysia, 1999.

11. Woram, John M. *The Recording Studio Handbook.* Elar, 1982.